



## Availability of Groundwater Resources in Southeastern New Hampshire

**Project Update: Summer 2005**

This newsletter is the second of a series intended to keep you informed of our progress. If you have any questions about the project, please contact:

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The proximity of the Seacoast region in southeastern New Hampshire to metropolitan Boston has led to a 36-percent population increase over the past 20 years. This population increase and associated development has been accompanied by an estimated 50-percent increase in the use of ground- and surface-water resources for drinking, industrial, and other purposes during the same period. Ensuring the sustainability of water resources into the future will require quantification of water storage and movement in surface- and groundwater systems and a thorough understanding of past, current and future water demands. To gain a better understanding of these processes, the participants of the Seacoast Groundwater Availability project are working on a three-year multi-disciplinary project.

Federal and State participants of this project are the U.S. Geological Survey, New Hampshire Coastal Program, and the New Hampshire Department of

Environmental Services, (which includes New Hampshire Geological Survey and New Hampshire Water Supply Engineering Bureau). In addition, Seacoast communities have contributed substantial resources to the project. Finally, the Groundwater Project Advisory team, made up of water-resource consultants, water suppliers, and planners in southeastern New Hampshire, has contributed their time and knowledge to this undertaking.

### **New Hampshire Geological Survey**

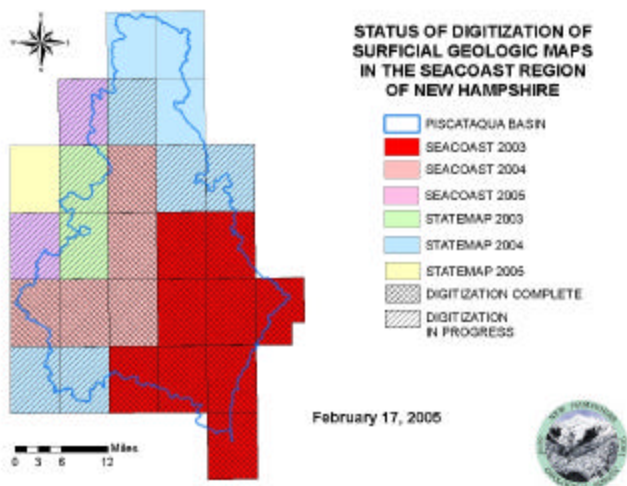
#### **Groundwater Database**

The New Hampshire Geological Survey (NHGS) has created a comprehensive database (GeoLogs) of subsurface hydrogeologic conditions. The database currently contains approximately 19,500 locations where exploratory soil borings and/or monitoring wells have been drilled. Parameters collected at the stations include local groundwater levels, soil type, and possibly bedrock types, aquifer properties, and geologic setting properties. Each station is geographically referenced to allow for inclusion in a Geographic Information System (GIS) for future analyses. The data is available for use, and is currently being used in a local groundwater flow model.

NHGS has been using a desktop GIS method to locate water wells reported by drilling contractors as part of the state's water well inventory program. To date 3,432 wells have been located in the project area with this method. Although the hydrogeologic data still contained in the well reports is not as detailed as that being compiled in the GeoLogs database described above, it provides valuable insight into subsurface hydrogeologic conditions.

### **Surficial Geology Map**

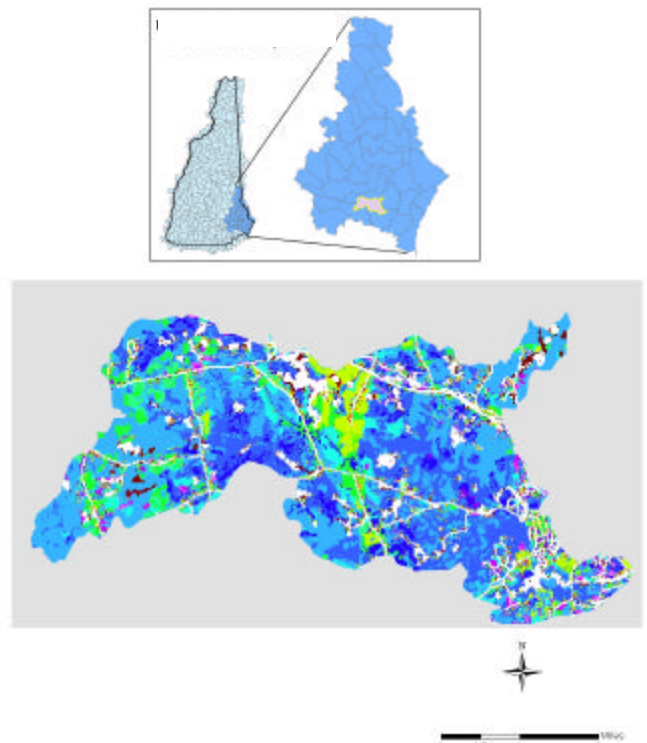
NHGS has completed converting surficial geologic quadrangle maps of the seacoast area to a digital form in order to create a seamless data layer in GIS (map below). Maps for 14 quadrangles have been converted. The information in the data layer will provide insight into the distribution and thickness of surficial geologic materials, helping communities to better understand and protect their groundwater resources as they plan for future development. The data layer is available for download from the GRANIT system at the University of New Hampshire by searching on theme keyword "surficial geology" at [http://www.granit.sr.unh.edu/cgi-bin/load\\_file?PATH=/data/database/index.htm](http://www.granit.sr.unh.edu/cgi-bin/load_file?PATH=/data/database/index.htm). In addition, hard copy maps will be available on a "print-on-demand" from the NHGS.



**Figure 1: Map showing status of the digitization of surficial geology maps.**

### **Regional Recharge Map**

NHGS is currently refining a simple, daily soil-water balance model to estimate the spatial variability of groundwater recharge throughout the Seacoast region. This model incorporates a digital elevation model, land use/ land cover data, soils and surficial geologic data, and daily hydrometeorologic data. The final maps will depict variations in recharge generalized from a maximum spatial resolution of 30-meters and will be a resource for future planning and development in the Seacoast Region. In addition, The Nature Conservancy and the Society for the Protection of New Hampshire Forests will incorporate the data from this model into a watershed-wide land conservation plan.



**Figure 2: Results from regional recharge study pilot project. The index map above shows the location of the watershed, and the map below indicates areas of increased recharge (darker colors) vs. less recharge (lighter colors). Note the low recharge white lines in the map, indicating roads.**

## U.S. Geological Survey

### **Groundwater Model**

A groundwater flow model is being developed to quantify groundwater resources in the Seacoast. The model covers a 120-mi<sup>2</sup> area east of Great Bay from Seabrook to Portsmouth, and incorporates data from NHGS data collection efforts, USGS hydrologic studies, and other investigations.

The next step in finalizing the model is the calibration and estimation of the effects of future water demands. We are moving forward on these tasks as analyses from the water use investigation become available. Once the model is completed this fall, it will be used to assess the effects of future growth on the availability of water resources of the area.

For more information about the USGS groundwater flow model see:

[http://nh.water.usgs.gov/CurrentProjects/seacoast/gw\\_model.htm](http://nh.water.usgs.gov/CurrentProjects/seacoast/gw_model.htm).

### **Streamflow Data Collection**

Analysis of streamflow data has been completed for six streamflow gaging stations for use in calibration of the Seacoast groundwater-flow model. Several streamflow gages installed by the project, including the Winnicut River in Greenland, the Isinglass River in Rochester, the Little River in North Hampton, and the North River in Epping, have real-time reporting accessible at:

<http://nh.water.usgs.gov/CurrentProjects/seacoast/monitor.htm>.

### **Water Use**

The water-use data analysis is nearly complete and will be finished this fall. Currently, we are working on finalizing a statistical model based on 6,000 domestic-meter readings that will estimate a per-capita (gallons per person

per day) water-use rate for each Census block in the Seacoast region. Through analysis of commercial and industrial meter readings, we have found that there is a significant range in water-use rates per type of establishment based on type of commercial activity, such as store, office, business, hotel/motel, or restaurant and by size of the establishment. The water-use rates are used in estimating current water use in non-metered areas and to determine how much water is required to meet future development. At the town level we anticipate the following products: (1) a map of current water use by census block, (2) a figure showing sources, use types, and wastewater disposal, and (3) a table of current and future water use by use type.

Another product of the water use investigation includes updated computer maps of community water-distribution and wastewater-collection systems, treatment plants, and discharge points. The maps will be available when the project is completed this fall, and the raw data has been provided to the Seacoast Region Wastewater Management Feasibility Study. Additionally, a survey involving middle school classes in the Seacoast region has been completed. This study determined that Seacoast residents that have their own well and those served by community water systems use water at the same average rate.

These findings (available at [http://des.nh.gov/Coastal/Restoration/middle\\_results.htm](http://des.nh.gov/Coastal/Restoration/middle_results.htm)) have been significant in determining accurate and updated per capita water-use rates for the Seacoast area. Through this analysis, we have found that per capita water use rates vary significantly (double) from one town to another. All water-use products from the study will be completed this fall.

**Thank you for your interest, and please contact us with any questions!**

**For more information: An overview and details of the project can be found at:**  
**<http://www.des.state.nh.us/coastal/Restoration/groundwater.htm>**